



PCT/GB 0 0 / 0 3 8 9 2



INVESTOR IN PEOPLE

The Patent Office
Concept House

Cardiff Road

Newport REC'D 01 NOV 2000

South Wales

NP10 8QQPO

PCT

**PRIORITY
DOCUMENT**

SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH RULE 17.1(a) OR (b)

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.

Signed

Dated 17 October 2000

11-10-99 15:36

+44 113 230 4702

P.02

R-103

Job-764

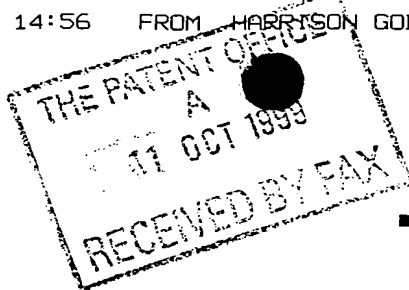
OCT-1999 14:56

FROM HARRISON GODDARD FOOTE

TO 01633814444

P.02

Patents Form 1/77

**The
Patent
Office**11OCT99 5483077-2 002973
POL/7700 0.00 - 9923959.2**Request for grant of a patent****The Patent Office**
Cardiff Road
Newport
Gwent NP9 1RH

1	Your reference	MRH/P15832		
2	Patent application number	11 OCT 1999 9923959.2		
3	Full name, address and postcode of the applicant Patents ADP number State of incorporation	Innovata Biomed Limited The Ziggurat Grosvenor Road ST ALBANS AL1 3HW UK 4047130004.✓		
4	Title of the invention	INHALER		
5	Name of agent Address for service Patents ADP number	Harrison Goddard Foote Belmont House 20 Wood Lane Headingley Leeds LS6 2AE 15571001✓		
6	Priority applications	Country	Priority App No	Date of Filing

Patents Form 1/77

Page 1 of 2

Patents Form 1/77

7	Parent application (eg Divisional)	Earlier Application No	Date of Filing
8	Statement of Inventorship Needed?		
9	Number of sheets for any of the following (not counting copies of same document) Continuation sheets of this form Description Claims Abstract Drawings	3	
10	Number of other documents attached Priority documents Translations of priority documents P7/77 P9/77 P10/77 Other documents		
11	I/We request the grant of a patent on the basis of this application. Signature <u>Harrison Goddard Foote</u> Date 11 Oct 1999		
12	Name and daytime telephone number of person to contact in the United Kingdom Michael R Harrison +44 113 2258350		

INHALER

FIELD OF THE INVENTION

This invention relates to inhalers, which are devices for use in delivering a dose of
5 medicament or other substance for inhaling into the lungs.

BACKGROUND OF THE INVENTION

Inhalers make use of medicament in a finally divided powder form. The powder may
be located within the inhaler, for instance, in a single storage compartment or in a
10 plurality of single dose locations.

Another form of inhaler may make use of medicament powder which is located
within a frangible, plastic capsule. In use, the capsule is inserted into the inhaler and
operation of the inhaler ruptures from the plastic capsule so that the powder may be
15 extracted from the capsule and inhaled by the user.

A problem encountered with all inhalers making use of powdered medicament is that,
if moisture comes into contact with the powder, it will tend to make it less free-
flowing and therefore render the operation of the inhaler less effective because the
20 correct dose of powder cannot be fully inhaled.

Moisture may access the powder via several different mechanisms. These include the
passage of the moisture through the plastic wall of encapsulated powder for those
inhalers which make use of capsules loaded with medicament powder. For those
25 inhalers which include a storage compartment loaded with powder and from which a
dose of powder is accessed by some form of moving part within the inhaler and then
presented to an air passageway for inhalation, moisture can access powder within the
storage compartment by finding its way along a gap or gaps between the moving
parts. In some inhalers there is the possibility of a "wick" type path being established
30 between the powder in a storage compartment within the inhaler and a location
within the inhaler where a dose of medicament is located.

With inhalers where a plurality of single doses of medicament is located within the inhaler, there is again likely to be one or more moving parts, providing gaps along which moisture may travel to access each individual dose of medicament.

It is also possible that moisture can pass through the plastic walls of inhalers and reach the powder contained within the inhaler whether in a single storage compartment or in individual dosage locations.

10 STATEMENTS OF INVENTION

The present invention provides an inhaler for delivering a substance in a finally divided form, the inhaler including a surface or surfaces provided with a moisture resistance coating.

15 The moisture resistance coating may be provided on one or more external or internal surfaces of the body of the inhaler. Particularly in the case of an inhaler making use of encapsulated powder, the moisture resistance coating may be applied to the outer and/or inner surface of the capsule, although other surfaces of the body of the inhaler may also be provided with a moisture resistant coating.

20 The moisture resistant coating may be in the form of any material which is effective to prevent moisture accessing the powder. Typically, it may be applied to those surfaces between which there may be a gap due to relative movement between the surfaces when the inhaler is in use. However, the moisture resistant coating may be
25 applied additionally or alternatively to other surfaces including the whole or part of the external surface of the inhaler in order to prevent moisture passing into the interior of the inhaler through the walls thereof.

The moisture resisting coating should, of course be sufficiently stable and robust so
30 that damage to the coating during use of the inhaler is avoided.

DETAILED DESCRIPTION OF THE INVENTION

Moisture resistant coatings which may be used in the present invention may now be described, by way of examples only.

- 5 Polymers of poly-para-xylylenes are known as parylene. This material is a conformal polymer film which has been used in a number of applications, including electronics circuits and sensors, where environmental and dielectric isolation is required.

- 10 Parylenes are thermoplastic polymers that are capable of polymerising on surfaces from an active monomer gas, without the presence of a liquid. The process is capable of producing very thin layers of polymer and, indeed, a layer of from 10 to 20 microns may be sufficient to protect inhalers and their parts, from ingress of moisture.

- 15 The polymerisation process takes place at room temperature without solvents and additives. Since the parylene is applied as a gas it conforms to the topography of the surface which it contacts. Since the position does not involve a liquid phase, there is no pooling and bridging during application. The coating is free of pinholes even if the coating has a thickness of less than one micron. As well as being resistant again
20 moisture, parylene is also resistant against other media including hydrocarbons, acids and blood.

The coating may be applied in a single vacuum-coating operation in a thickness from 0.025 to 75 microns and can be controlled accurately to $\pm 10\%$ of the final thickness.